

BOOK ANNOUNCEMENTS

Hartmut NOLTEMEIER, editor, *Graphtheoretic Concepts in Computer Science*, Proceedings of the International Workshop WG 80, Bad Honnef, June, 1980. Lecture Notes in Computer Science, Vol. 100 (Springer-Verlag, Berlin, Heidelberg, New York, 1981) 403 pp.

Preface. *H. Maurer*: The post-office problem and related questions. *H. Nishio*: Series of graphs generated by rational machines. *K.-U. Witt*: On linearizing graphs. *H.J. Schneider*: Set-theoretic concepts in programming languages and their implementation. *M. Nagl*: Graph rewriting and automatic, machine-independent program optimization. *H.J. Ludwigs*: Properties of ordered graph grammars. *J.L. Bentley/Th. Ottmann*: The power of a one-dimensional vector of processors. *K. Mehlhorn*: A new data structure for representing sorted lists. *G. Tinhofer*: On the use of some almost sure graph properties. *H. Noltemeier*: On a generalization of heaps. *M. Schnitzler*: Graph grammars and the complexity gap in the isomorphism problem for acyclic digraphs. *A.L. Rosenberg*: Issues in the study of graph embeddings. *C. Batini/A. D'Atri*: Schema hypergraphs: A formalism to investigate logical data base design. *P. Kandzia/M. Mangelmann*: The use of transitively irreducible kernels of full families of functional dependencies in logical data base design. *G. Ausiello/A. D'Atri/D. Saccà*: Graph algorithms for the synthesis and manipulation of data base schemes. *Th. Ottmann/H.-W. Six/D. Wood*: The analysis of search trees: A survey. *H.-W. Six*: A framework for data structures. *G. Schmidt*: Investigating programs in terms of partial graphs. *S. Even/Y. Yacobi*: An observation concerning the complexity of problems with few solutions and its application to cryptography. *B. Monien/I.H. Sudborough*: Bounding the bandwidth of NP-complete problems. *I.H. Sudborough*: The complexity of path problems in graphs and path systems of bounded bandwidth. *H.-J. Kreowski*: A comparison between petri-nets and graph grammars. *W. Reisig*: A graph grammar representation of nonsequential processes. *J. Perl/J. Ebert*: Reachability homomorphisms on nets. *B. Mahr*: A bird's-eye view to path problems. *P. Brucker*: The chinese postman problem for mixed graphs. *O. Vornberger*: Alternating cycle covers and paths. *P. Läuchli*: Generating all planar 0-, 1-, 2-, 3-connected graphs. *H. Hamacher*: Optimal (s, t) -cuts. *U. Derigs*: F -factors, perfect matchings and related concepts.

D.N. BURGHEES and A.D. WOOD, *Mathematical Models in the Social, Management and Life Sciences*, Ellis Horwood Series: Mathematics and its Applications (Series editor: Professor G.M. Bell) (Ellis Horwood Ltd., Chichester; Halsted Press: a division of Wiley, New York—Chichester—Brisbane—Toronto, 1980) 283 pp.

Preface. *Chapter 1: Mathematical Modelling: Aims and Philosophy*. Mathematics and Society. Mathematical Modelling – Its Role and Limitations. Case Study. Future Trends. Introduction to the Book. *Chapter 2: Sequences and Series*. The Gnome Corporation Redemption Issue. Sequences; Arithmetic and Geometric Progressions. Solution to the Case Study. Case Studies: Nominal and Effective Interest Rates; Mr. Smith's Mortgage Problems; The Multiplier; The size of the Firm. Problems. *Chapter 3: Limits and Continuity*. The Case of the Bakewell Bean Promotion. The Theory of Functions of a Real Variable. Solution of the Bakewell Bean Promotion Problem. Case Studies: Production Costs; Continuously Accruing Interest: the Exponential and Logarithmic Functions. Problems. *Chapter 4: Turning points and Changes: Models Based on the Differential Calculus*. The Case of the Wonderbike Selling Price. Derivatives and Maxima and Minima of Functions of a Real Variables. Solution of the Wonderbike Selling Problem. Case Studies: The Economics of Produc-

tion – Diminishing Returns; Drug Concentration in the Blood Stream; The Kertz Leasing Company. Problems. *Chapter 5: Growth and Decay: Models Based on First Order Differential Equations.* The Case of Cuspid Containers. Theory of First Order Differential Equation. The Solution of the Cuspid Containers Problem. Case Studies: The National Debt and Gross National Product. Population Growth. Drug Distribution in the Body. Dating Archaeological Samples. Response of Sales to Advertising. Problems. *Chapter 6: Cycles and Oscillations: Models Based on Second Order Differential Equations.* Control of the Economy by Government Spending. The Second Order Linear Differential Equation with Constant Coefficients. Solution of the Case Study. Case Studies: Pricing Policy for Optimum Inventory Level; Interacting Species. Problems. *Chapter 7: Step by Step: Difference Equations.* A National Economy Model for Jedsland. Difference Equations Theory: Linear First Order; Linear n th Order; Homogeneous Second Order; Particular Solutions; Jedsland's National Economy. Case Studies: A Simple Population Problem; The Cobweb Model of Supply and Demand; Prices and Inventory. Problems. *Chapter 8: Vectors and Matrices: Linear models with Several Variables.* The Yummy Jam Company. Vector and Matrices – Preliminary Theory. Matrix Representation for the Yummy Jam Company. Input–output Models. Systems of Linear Equations. Input–output Solution. Case Studies: Coexistence of Bacteria; Production Explosion; Discrete Population Model with an Age Distribution. Problems. *Chapter 9: Optimal Policy Decisions: Models based on Optimization Techniques.* The Precision Tool Company. Optimization Techniques. Solution of the Precision Tool Company's Problem. Case Studies: Stock Control with Shortages; Optimal Warehouse Area; Production Planning; Routeing Problem; Resource Allocation. Problems. *Chapter 10: Theory of Games.* The Prisoner's Dilemma. Rectangular Two-person Games. Case Studies: Competitive strategies; How to Beat General von Kluge; Jamaican Fishermen. Problems. *Chapter 11: An Explanation of Discontinuous Phenomena: Models Based on Catastrophe Theory.* The Case of the Tatopops Launch. The Cusp Catastrophe. The Cusp Catastrophe Model for the Tatopops Launch. Case Studies. "Never Pat a Cowering Dog". Catastrophes in Higher Dimensions. Mathematical Publication. Problems. *Appendix I:* Number Systems. *Appendix II:* Integration. *Appendix III:* Partial Differentiation. *Bibliography and References. Answers to Problems. Index.*

Horst HAMACHER, *Flows in Regular Matroids*, Mathematical Systems in Economics, Vol. 69 (Verlag Anton Hain, Meisenheim GmbH, Königstein/Ts, Germany; Oelgeschlager, Gunn & Hain, Inc., Cambridge, MA, U.S.A., 1981) 164 pp.

Chapter 1: Combinatorial and algebraic foundations. Matroids, Regular matroids, Examples for regular and non-regular matroids, Ordered semigroups $(H, *, \leq)$, Examples of ordered semigroups. *Chapter 2: Maximal M -flows.* The Max M -Flow – Min Cocircuit Theorem and the Augmenting Circuit Algorithm, Decomposition of M -flows, Incremental matroids, Differences of M -flows. *Chapter 3: M -flows with lower capacities.* Determining maximal and minimal admissible M -flows, Admissibility Theorem and an algorithm for determining admissible M -flows, Decomposition of M -flows with lower capacity functions. *Chapter 4: Minimal cost M -flows.* Negative Circuit Algorithm, Shortest Augmenting Circuit Algorithm, Determining negative and shortest augmenting circuits, Compatibility Matroid Algorithm, Transformation Method. *Chapter 5: First application of the theory of M -flows: Algebraic flows in graphs.* Foundations, Maximal algebraic flows in graphs, Algebraic Max-Flow Min-Cut Theorem, Decomposition of algebraic flows, Incremental graphs and layered graph algorithms, Difference of flows in graphs, Flows in graphs with lower capacity function, Maximal and minimal admissible flows, Admissibility Theorem, Decomposition of flows in graphs, Minimal cost flows in graphs, Negative Circuit Algorithm, Shortest Augmenting Path Algorithm, Determining negative and shortest augmenting circuits by means of node functions, Compatibility graphs, Transformation Method. *Chapter 6: Second application of the theory of M -flows: Lexicographical M -flow problems.* The problem and its algebraic solution, Reduction to real-valued M -flow problems, Combinatorial comparison of the solution methods, Applications: Optimal cuts and shortest paths. *Appendix 1:* Graph-theoretical definitions and denotations. *Appendix 2:* List of symbols. *References. Subject Index.*

J. van der WAL, *Stochastic Dynamic Programming*, Successive Approximations and Nearly Optimal Strategies for Markov Decision Processes and Markov Games, Mathematical Centre Tracts 139 (Mathematisch Centrum, Amsterdam, 1981) 238 pp.

Acknowledgement. *Chapter 1: General Introduction*. Informal description of the models. The functional equations. Review of the existing algorithms. Summary of the following chapters. Formal description of the MDP model. Notations. *Chapter 2: The General Total Reward MDP*. Introduction. Some preliminary results. The finite-stage MDP. The optimality equation. The negative case. The restriction to Markov strategies. Nearly-optimal strategies. *Chapter 3: Successive Approximation Methods for the Total-Reward MDP*. Introduction. Standard successive approximations. Successive approximation methods and go-ahead functions. The operators $L_\delta(\pi)$ and U_δ . The restriction to Markov strategies in $U_\delta v$. Value-oriented successive approximations. *Chapter 4: The Strongly Convergent MDP*. Introduction. Conservingness and optimality. Standard successive approximations. The policy iteration method. Strong convergence and Liapunov functions. The convergence of $U_\delta^n v$ to v^* . Stationary go-ahead functions and strong convergence. Value-oriented successive approximations. *Chapter 5: The Contracting MDP*. Introduction. The various contractive MDP models. Contraction and strong convergence. Contraction and successive approximations. The discounted MDP with finite state and action spaces. Sensitive optimality. *Chapter 6: Introduction to the Average-Reward MDP*. Optimal stationary strategies. The policy iteration method. Successive approximations. *Chapter 7: Sensitive Optimality*. Introduction. The equivalence of k -order average optimality and $(k-1)$ -discount optimality. Equivalent successive approximation methods. *Chapter 8: Policy Iteration, Go-ahead Functions and Sensitive Optimality*. Introduction. Some notations and preliminaries. The Laurent series expansion of $L_{\beta, \delta}(h)v_\beta(f)$. The policy improvement step. The convergence proof. *Chapter 9: Value-Oriented Successive Approximations for the Average-Reward MDP*. Introduction. Some preliminaries. The irreducible case. The general unichain case. Geometric convergence for the unichain case. The communicating case. Simply connectedness. Some remarks. *Chapter 10: Introduction to the Two-Person Zero-Sum Markov Game*. The model of the two-person zero-sum Markov game. The finite-stage Markov game. Two-person zero-sum Markov games and the restriction to Markov strategies. Introduction to the ∞ -stage Markov game. *Chapter 11: The Contracting Markov Game*. Introduction. The method of standard successive approximations. Go-ahead functions. Stationary go-ahead functions. Policy iteration and value-oriented methods. The strongly convergent Markov game. *Chapter 12: The Positive Markov Game Which can be Terminated by the Minimizing Player*. Introduction. Some preliminary results. Bounds on v^* and nearly-optimal stationary strategies. *Chapter 13: Successive Approximations for the Average-Reward Markov Game*. Introduction and some preliminaries. The unichained Markov game. The functional equation $Uv = v + ge$ has a solution. *References. Symbol index. Subject index.*

J.H. van GELDROEP, *A Mathematical Theory of Pure Exchange Economies Without the No-Critical-Point Hypothesis*, Mathematical Centre Tracts 140 (Mathematisch Centrum, Amsterdam, 1981) 108 pp.

Acknowledgements. Preface. *Chapter 1: Introduction*. Commodities, prices and preferences. The set of equilibria. The set of local Pareto optima. Disastrous allocations. Survey. Some examples. *Chapter 2: Preliminaries on manifolds*. Introduction. Differentiable mappings and submanifolds. Sard's Theorem. The Whitney C^∞ topology. Transversality. Characterization of local Pareto optima. The submanifold T . *Chapter 3: The set T* . Introduction. A first definition of T . An alternative definition of T . Comparison with the results of Smale. T is not dependent on scale transformations. T is a dense subset of $C^\infty(\mathbb{R}^l, \mathbb{R})^m$. Is T open in $C^\infty(\mathbb{R}^l, \mathbb{R})^m$? *Chapter 4: The set of equilibria in a pure exchange economy*. Introduction. Regular economies. An example. The set E . *Chapter 5: The set of local strict Pareto optima in a pure exchange economy*. Introduction. Regular pairs. Local structure of $\theta_{cr}(\sum_{i=1}^m z_i, u)$. A local optimal part of θ_{cr} . Some examples. *Chapter 6: Trade curves*. Introduction. Construction of a vector field, generating trade curves. An example. *References. Index.*

Vera PLESS, *Introduction to the Theory of Error-Correcting Codes* (Wiley, New York–Chichester–Brisbane–Toronto–Singapore, 1982) 161 pp.

Preface. *Chapter 1: Introductory concepts.* Introduction. Basic Definitions. Weight, Minimum Weight, and Maximum-Likelihood Decoding. Problems. *Chapter 2: Useful background.* Syndrome Decoding. Perfect Codes, Hamming Codes, Sphere-Packing Bound. More General Facts. Self-Dual Codes, the Golay Codes. Problems. *Chapter 3: A double-error-correcting B.C.H. code and a finite field of 16 elements.* The Problem. Polynomials. A Finite Field of 16 Elements. The Double-Error-Correcting Bose–Chaudhuri–Hocquenghem (B.C.H.) Code. Problems. *Chapter 4: Finite fields.* Groups. The Structure of a Finite Field. Minimal Polynomials. Factoring $x^n - 1$. Problems. *Chapter 5: Cyclic codes.* The Origin and Definition of Cyclic Codes. How to Find Cyclic Codes: The Generator Polynomial. The Generator Polynomial of the Dual Code. Idempotents and Minimal Ideals for Binary Cyclic Codes. Problems. *Chapter 6: The group of a code and quadratic residue (Q.R.) codes.* Some Cyclic Codes We Know. Permutation Groups. The Group of a Code. Definition of Quadratic Residue (Q.R.) Codes. Extended Q.R. Codes, Square Root Bound, and Groups of Q.R. Codes. Permutation Decoding. Problems. *Chapter 7: Bose–Chaudhuri–Hocquenghem (B.C.H.) codes.* Cyclic Codes Given in Terms of Roots. Vandermonde Determinants. Definition and Properties of B.C.H. Codes. Problems. *Chapter 8: Weight Distributions.* Preliminary Concepts and a Theorem on Weights in Homogeneous Codes. The MacWilliams Equations. Pless Power Moments. Gleason Polynomials. Problems. *Chapter 9: Designs.* Designs. Designs and Codes. The Assmus–Mattson Theorem and a Design-Decoding Scheme. Symmetry Codes. Problems. *Chapter 10: Some codes are unique.* The Hamming Code and the Ternary Golay Codes are Unique. “Glue”. The Steiner System $S(5, 8, 24)$ is Unique. The Binary $(24; 12; 8)$ Code is Unique and So Is the Binary $(23, 12, 7)$ Code. Problems. *Appendix: Problems. References. Index.*

J. TELGEN, *Redundancy and Linear Programs*, Mathematical Centre Tracts 137 (Mathematisch Centrum, Amsterdam, 1981).

Preface. Introduction. *Part 1: Redundancy:* 1. Introduction and survey. 2. Practical considerations. 3. Theory: Inequalities, Equalities, Implicit equalities, Minimal representation, Existing theory. 4. Methods: Implicit equalities, Redundant constraints, Minimal representations, Existing methods. 5. Applications: Results from literature, Experimental results. 6. Related Topics: Nonbinding constraints, Primal-dual relations. 7. Conclusion. *Part 2: Linear Programs:* 8. Introduction. 9. The simplex method. 10. The complexity of linear programming. 11. LP-equivalent problems. 12. The ellipsoidal method. 13. Conclusion. *References. Subject index. Author index.*